MEMORANDUM OF UNDERSTANDING

BETWEEN THE

UNITED STATES
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

AND THE

ITALIAN SPACE AGENCY

CONCERNING THE

GAMMA-RAY LARGE AREA SPACE TELESCOPE MISSION

Preamble

The United States National Aeronautics and Space Administration (hereinafter referred to as "NASA"), and

The Italian Space Agency (hereinafter referred to as "ASI"),

Collectively hereinafter referred to as "the Parties":

CONSIDERING that NASA is developing the Gamma-ray Large Area Space Telescope (GLAST) mission;

CONSIDERING that NASA is engaged in a vigorous, long-term exploration program that is designed to improve our understanding of the universe;

CONSIDERING that ASI has a well-defined strategy in the field of gamma-ray astronomy starting from the national BeppoSAX mission, followed by the Italian participation on the NASA Swift mission, and in developing the national small mission AGILE;

RECOGNIZING that ASI is interested in joining with NASA as a key participant on the GLAST mission;

RECALLING the interim agreement of November 11, 2004, between NASA and ASI, addressing an interest to pursue activities together on GLAST;

HAVE AGREED as follows:

Article 1 - Scope

1.1 This Memorandum of Understanding (MOU) defines the responsibilities, ways, and means, as well as the terms and conditions, by which the cooperation between the Parties shall be conducted within the framework of NASA's GLAST mission.

1.2 The primary activities addressed in this MOU concern the participation in the development of the Large Area Telescope (LAT) tracker subsystem and in the LAT scientific investigations by ASI and its related entity, the National Institute of Nuclear Physics (INFN).

Article 2 - The GLAST Mission

2.1 NASA's GLAST mission is designed to identify and study nature's highest energy particle accelerators, measuring, with two instruments, the spectra and temporal histories of gamma rays in the energy range from 10 keV to 300 GeV. The LAT, the primary GLAST instrument,

covers the energy range 20 MeV to 300 GeV. The GLAST Burst Monitor (GBM) instrument complements the LAT, monitoring the sky for transients in the energy range 10 keV to 25 MeV.

2.2 GLAST is expected to observe at least ten times as many active galactic nuclei and stellar-mass black holes as previously detected in the gamma-ray band. It is intended to study pulsars and supernova remnants, gamma-ray bursts, the diffuse galactic and extragalactic high-energy gamma-ray backgrounds, and solar flares. GLAST is also designed to search for annihilation-line radiation from weakly interacting massive particles that may account for much of the dark matter in the universe.

Critical mission milestones (estimated)	
Launch:	No Earlier Than November 2007
Primary Science Phase:	60 Days After Launch for 5 Years
Critical mission parameters	
Nominal Orbit:	550 km
Inclination:	28.5 degrees
Nominal Lifetime:	5 years (10-year goal)

Article 3 - Programmatic Responsibilities of NASA

NASA shall use reasonable efforts to fulfill the responsibilities below:

3.1 Provide overall program management for the GLAST mission, including design, development, integration, launch, and operations.

3.2 Establish and support the GLAST Science Working Group (SWG), appoint a Project Scientist to serve as the SWG lead, and support, jointly with the United States Department of Energy (DOE), the LAT instrument team.

3.3 Arrange for the design of the GLAST mission, including requirements definition, design and development of subsystem specifications, verification plans, and overall mission requirements.

3.4 Provide overall management of the development of the LAT flight instrument including the silicon tracker subsystem.

3.5 Support the design and development of the LAT prototype and flight silicon tracker readout electronics and collaborate with ASI and its related entities on the design and development of the LAT tracker support structure subassemblies.

3.6 Integrate, with assistance from ASI and ASI's related entities, the tracker modules into the LAT instrument assembly and perform associated testing and calibration in the United States with assistance from ASI and its related entities.

3.7 Conduct, in the United States, a high-altitude balloon flight of GLAST instrument engineering models.

3.8 Provide the interfaces and data necessary for the ASI Science Data Center (ASDC) to serve as a mirror data site for the LAT science database at the LAT Instrument Operations Center (LIOC).

3.9 Establish and maintain a NASA GLAST Science Support Center (GSSC) consistent with GLAST mission data use policy as described in the GLAST Project Data Management Plan (PDMP).

3.10 Provide opportunities for participation of the general scientific community in the GLAST Guest Observer Program and Key Project opportunities defined in the GLAST PDMP.

3.11 Seek suggestions from ASI on candidate names of Italian scientists to participate as reviewers when the GLAST Guest Observer peer review teams are being formed.

Article 4 - Programmatic Responsibilities of ASI

ASI shall use reasonable efforts to fulfill the responsibilities below:

4.1 Participate, with its related entities, in the development of the LAT tracker subsystem, build eighteen tracker towers, and provide them directly to the Stanford Linear Accelerator Center (SLAC).

4.2 Ensure that INFN fulfills its GLAST-related responsibilities, including the provision of the LAT tracker hardware and operations expertise, LAT science planning, and data analysis, as needed.

4.3 Support LAT instrument team meetings and reviews, as appropriate.

4.4 Establish and maintain a mirror data site of the LAT science database, participate in the development of the GLAST/LAT data analysis software, and lead the development of and make available for the use of the GLAST LAT collaboration, the software for the publication of LAT catalogs and the distribution of high level data products via the World Wide Web.

4.5 Provide for the necessary interfaces to allow the ASDC to serve as a mirror site for the LAT data at the LIOC.

4.6 Participate as members of the LAT science team and in the LAT science investigation in accordance with the data use policy as described in the PDMP.

4.7 Provide suggestions to NASA on candidate names of Italian scientists to participate as reviewers when the GLAST Guest Observer peer review teams are being formed.

Article 5 - Rights in and Distribution of Scientific Data

5.1 Data generated under this MOU shall be treated in accordance with the GLAST data use policy as described in the PDMP.

5.2 The Parties shall have the right to use the data (processed and unprocessed) at any time for support of their respective responsibilities but shall not prejudice the mission investigators' first publication rights, which are established in accordance with paragraph 5.1 above.

5.3 The Parties and their investigators shall have immediate access to scientific data obtained by their respective investigations. The Parties shall work to ensure that all investigators have access to other telemetered science and engineering data relevant to the calibration/validation of the respective investigations.

Article 6 - Program and Project Management

This Article describes general management and organizational responsibilities. Each Party is responsible for the management of its activities as identified in Articles 3 and 4 above.

NASA Headquarters

6.1 The NASA Astrophysics Division Director, within the Science Mission Directorate, is responsible for the overall NASA Astrophysics Observation Program, is supported by mission-specific program executives, and is responsible for oversight of all NASA Astrophysics flight program activities, as well as formal programmatic liaison with ASI and liaison and coordination with other United States Government agencies.

6.2 The GLAST Program Executive is responsible for the definition, integration, and assessment of all activities related to the GLAST mission.

6.3 The GLAST Program Scientist is the primary point of contact for international discussions of science policy.

6.4 The GLAST Program Executive is the principal point of contact for NASA in the performance of this MOU.

NASA Goddard Space Flight Center (GSFC)

6.5 NASA has designated GSFC to lead the formulation and implementation of the GLAST mission. A GLAST Project Office has been established for this purpose, and a GLAST Project Manager has been assigned. This Project Office is part of the GSFC.

ASI Headquarters

6.6 The ASI Headquarters, Observation of the Universe, is responsible for overall programmatic and science management of the ASI-sponsored universe observation activities. Within this directorate, the Astrophysics Office is responsible for all activities regarding NASA GLAST cooperation. ASI has designated a GLAST Program/Project Manager and GLAST Program/Project Scientist to manage ASI contributions to GLAST. ASI also has designated a contract manager to manage the primary GLAST implementation contract.

6.7 The GLAST Program/Project Scientist is the principal point of contact for ASI in the performance of this MOU.

Article 7 - Transfer of Goods and Technical Data

The Parties are obligated to transfer only those technical data (including software) and goods necessary to fulfill their respective responsibilities under this MOU, in accordance with the following provisions, notwithstanding any other provision of this MOU:

7.1 All activities of the Parties will be carried out in accordance with their national laws and regulations, including those pertaining to export control and the control of classified information.

7.2 The transfer of technical data for the purpose of discharging the Parties' responsibilities with regard to interface, integration, and safety shall normally be made without restriction, except as provided in 7.1 above.

7.3 All transfers of goods and proprietary or export-controlled technical data are subject to the following provisions. In the event a Party or its related entity (e.g.; contractor, subcontractor, grantee, cooperating entity) finds it necessary to transfer goods or to transfer proprietary or export-controlled technical data, for which protection is to be maintained, such goods shall be specifically identified and such proprietary or export-controlled technical data shall be marked. The identification for goods and the marking on proprietary or export-controlled technical data will indicate that the goods and proprietary or export-controlled technical data shall be used by the receiving Party or related entities only for the purposes of fulfilling the receiving Party's or related entity's responsibilities under this MOU, and that

the identified goods and marked proprietary technical data or marked export-controlled technical data shall not be disclosed or retransferred to any other entity without the prior written permission of the furnishing Party or its related entity. The receiving Party or related entity shall abide by the terms of the notice and protect any such identified goods and marked proprietary technical data or marked export-controlled technical data from unauthorized use and disclosure. The Parties to this MOU will cause their related entities to be bound by the provisions of this Article related to use, disclosure, and retransfer of goods and marked technical data through contractual mechanisms or equivalent measures.

7.4 All goods exchanged in the performance of this MOU shall be used by the receiving Party or related entity exclusively for the purposes of this MOU. Upon completion of the activities under this MOU, the receiving Party or related entity shall return or, at the request of the furnishing Party or its related entity, otherwise dispose of all goods and marked proprietary technical data or marked export-controlled technical data provided under this MOU, as directed by the furnishing Party or related entity.

Article 8 – Intellectual Property

8.1 For the purposes of this Article, "Related Entity" includes but is not limited to contractors, subcontractors, grantees, or cooperating entities (or any lower tier contractor, subcontractor, grantee, or cooperating entities) of a Party.

8.2 Patents

a. Nothing in this MOU shall be construed as granting, either expressly or by implication, to the other Party any rights to, or interest in, any inventions of a Party or its Related Entities made prior to the entry into force of, or outside the scope of, this MOU, including any patents or other forms of protection (in any country) corresponding to such inventions.

b. Any rights to, or interest in, any invention made in the performance of this MOU solely by one Party or any of its Related Entities, including any patents or other forms of protection (in any country) corresponding to such invention, shall be owned by such Party or, subject to paragraph 2.d of this Article, such Related Entity.

c. It is not anticipated that there will be any joint inventions made in the performance of this MOU. Nevertheless, in the event that an invention is jointly made by the Parties in the performance of this MOU, the Parties shall, in good faith, consult and agree as to: a) the allocation of rights to, or interest in, such joint invention, including any patents or other forms of protection (in any country) corresponding to such joint invention; b) the responsibilities, costs, and actions to be taken to establish and maintain patents or other forms of protection (in any country) for each such joint invention; and c) the terms and conditions of any license or other rights to be exchanged between the Parties or granted by one Party to the other Party.

d. With respect to any invention created in the performance of this MOU and involving a Related Entity, allocation of rights between a Party and its Related Entity to such invention, including any patents or other forms of protection (in any country) corresponding to such invention, shall be determined by such Party's laws, regulations, and applicable contractual obligations.

8.3 Copyrights

a. Nothing in this MOU shall be construed as granting, either expressly or by implication, to the other Party any rights to, or interest in, any copyrights of a Party or its Related Entities created prior to the entry into force of, or outside the scope of, this MOU.

b. Any copyrights in works created solely by one Party or any of its Related Entities, as a result of activities undertaken in performance of this MOU, shall be owned by such Party or Related Entity. Allocation of rights between such Party and its Related Entities to such copyrights shall be determined by such Party's laws, regulations, and applicable contractual obligations.

c. For any jointly authored work, should the Parties decide to register the copyright in such work, they shall, in good faith, consult and agree as to the responsibilities, costs, and actions to be taken to register copyrights and maintain copyright protection (in any country).

d. Subject to the provisions of Articles 7 and 9, each Party shall have an irrevocable, royalty-free right to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, and authorize others to do so on its behalf, any copyrighted work resulting from activities undertaken in the performance of this MOU for its own purposes, regardless of whether the work was created solely by, or on behalf of, that Party or jointly with the other Party, and without consulting with or accounting to the other Party.

Article 9 – Publication of Public Information and Results

9.1 The Parties retain the right to release public information regarding their own activities under this MOU. The Parties shall coordinate with each other in advance concerning releasing to the public information that relates to the other Party's responsibilities or performance under this MOU. As appropriate, full acknowledgement shall be made by both Parties of the role of the other Party in the GLAST mission.

9.2 a. The Parties shall make the final results obtained from the GLAST mission available to the general scientific community through publication in appropriate journals or by presentations at scientific conferences as soon as possible and in a manner consistent with good scientific practices.

b. Each Party shall have an irrevocable, royalty-free right to reproduce, prepare derivative works from, distribute to the public copies of, present publicly, and authorize others to

do so on its behalf, the scientific information included in each such publication or presentation for its own purposes. The royalty-free right shall exist irrespective of any copyright protection applicable to each such publication or presentation.

9.3 The Parties acknowledge that the following data or information does not constitute public information and that such data or information shall not be included in any publication or presentation by a Party under this article without the other Party's prior written permission: 1) data furnished by the other Party in accordance with Article 7 of this MOU which is export-controlled, classified or proprietary; or 2) information about an invention of the other Party before a patent application has been filed covering the same, or a decision not to file has been made.

Article 10 - Financial Arrangements

10.1 Each Party will bear the costs of discharging its respective responsibilities, including travel and subsistence of personnel and transportation of all equipment and other items for which it is responsible.

10.2 The ability of the Parties to carry out their obligations is subject to the availability of appropriated funds. Further, it is understood that NASA's ability to carry out its overall responsibilities under this MOU is also subject to DOE funding necessary to complete its contributions to development of the LAT, and DOE contributions are also subject to the availability of appropriated funds.

10.3 The Parties understand that ASI's ability is also subject to INFN funding necessary to complete its contributions, and the INFN contribution is also subject to the availability of appropriated funds.

10.4 Should either NASA or ASI encounter budgetary problems that may affect the activities to be carried out under this MOU, the Party encountering the problems will notify and consult with the other Party as soon as possible. NASA and ASI also agree to monitor the funding status of their respective related entities and notify and consult with the other Party as soon as possible should their related entities encounter budgetary problems.

Article 11 - Customs Clearance, Taxes, Immigration and Ownership

11.1 In accordance with the laws and regulations in force in each Party's respective country, each Party shall facilitate free customs clearance and waiver of all applicable customs duties and taxes for equipment and related goods necessary for the implementation of this MOU. In the event that any customs duties or taxes of any kind are nonetheless levied on such equipment and related goods, such customs duties or taxes shall be borne by the Party of the country levying such customs duties or taxes. The Parties' obligation to facilitate duty free entry and exit of equipment and related goods is fully reciprocal.

11.2 Subject to applicable laws and regulations, each Party shall facilitate provision of the appropriate entry and residence documentation for the other Party's personnel who enter, exit, or reside within its territory in order to carry out the activities under this MOU.

11.3 Equipment provided by ASI pursuant to this MOU will remain the property of ASI. Equipment provided by NASA pursuant to this MOU will remain the property of NASA.

Article 12 - Exchange of Technical Personnel

12.1 Each Party may temporarily locate a mutually agreed-upon number of its personnel at the other Party's respective facilities in the United States and Italy to participate in technical activities described in this MOU. Each Party shall provide workspace and necessary office equipment to accommodate the other Party's personnel that shall be temporarily located in the United States and Italy. Salary and all other personnel expenses, such as living and travel expenses, shall be borne by the employing Party of the technical representative(s) throughout the duration of their assignment. Arrangements for, and all conditions relating to, the personnel relationships, shall be agreed to and jointly documented in writing between NASA and ASI. These personnel shall comply with the safety and security rules and regulations of the hosting Party.

Article 13 - Registration of Space Objects

13.1 NASA shall request that the U.S. Government register GLAST in accordance with the 1975 Convention on Registration of Objects Launched into Outer Space (the Registration Convention). NASA shall retain jurisdiction and control over the space objects it registers.

13.2 Registration pursuant to this paragraph shall not affect the rights or obligations of either Party or its Government under the 1972 Convention on International Liability for Damage Caused by Space Objects.

Article 14 - Liability

14.1 The Parties agree that a comprehensive cross-waiver of liability among the Parties and their related entities will further participation in space exploration, use, and investment. The cross-waiver of liability shall be broadly construed to achieve this objective. The terms of the waiver are set out below.

14.2 The following terms, as used in this Article are defined below:

a. The term "Party" has the meaning specified in the Preamble;

b. The term "related entity" means:

(i) a contractor, subcontractor, or sponsored entity of a Party at any tier;
(ii) a user or customer of a Party at any tier;
(iii) a contractor or subcontractor of a user or customer or sponsored entity of a Party at any tier; or
(iv) scientific investigators.

The term "related entity" may also include another State or an agency or institution of another State, where such State, agency, or institution is an entity as described in (i) through (iv) above or is otherwise involved in the activities undertaken pursuant to this MOU.

The terms "contractors" and "subcontractors" include suppliers of any kind.

c. The term "damage" means:

(i) bodily injury to, or other impairment of health of, or death of, any person;
(ii) damage to, loss of, or loss of use of any property;
(iii) loss of revenue or profits; or
(iv) other direct, indirect, or consequential damage.

d. The term "launch vehicle" means an object or any part thereof intended for launch, launched from Earth, or returning to Earth that carries payloads or persons, or both;

e. The term "payload" means all property to be flown or used on or in a launch vehicle; and

f. The term "Protected Space Operations" means all activities pursuant to this MOU, including launch vehicle activities and payload activities on Earth, in outer space, or in transit between Earth and outer space. "Protected Space Operations" begin at the signature of this MOU and ends when all activities done in implementation of this MOU are completed. "Protected Space Operations" include, but are not limited to:

(i) research, design, development, test, manufacture, assembly, integration, operation, or use of launch or transfer vehicles, payloads, or instruments, as well as related support equipment and facilities and services; and

(ii) all activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services.

The term "Protected Space Operations" excludes activities on Earth that are conducted on return from space to develop further a payload's product or process for use other than for the joint activity in question.

14.3. a. Each Party agrees to a cross-waiver of liability pursuant to which each Party waives all claims against any of the entities or persons listed in subparagraphs (i) through (iii) below based on damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for damage, whatever the legal basis for such claims, against:

(i) the other Party;
(ii) a related entity of the other Party; or
(iii) the employees of any of the entities identified in subparagraphs (i) and (ii) immediately above.

b. In addition, each Party shall extend the cross-waiver of liability, as set forth in subparagraph 14.3.a above, to its own related entities by requiring them, by contract or otherwise, to agree to waive all claims against the entities or persons identified in subparagraphs 14.3.a (i) through 14.3.a (iii) above.

c. Notwithstanding the other provisions of this section, this cross-waiver of liability shall not be applicable to:

(i) claims between a Party and its own related entity or between its own related entities;
(ii) claims made by a natural person, his/her estate, survivors, or subrogees for bodily injury, other impairment of health, or death of such natural person, except where the subrogee is a Party to this MOU or has otherwise agreed to be bound by the terms of this cross-waiver;
(iii) claims for damage caused by willful misconduct;
(iv) intellectual property claims;
(v) claims for damage resulting from a failure of a Party to extend the cross-waiver of liability, as set forth in subparagraph 14.3.b, or from a failure of a Party to ensure that their related entities extend the cross-waiver of liability as set forth in subparagraph 14.3.b; or
(vi) contract claims between the Parties based on the express contractual provisions.

d. Nothing in this Article shall be construed to create the basis for a claim or suit where none would otherwise exist.

e. For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of liability arising from the 1972 Convention on International Liability for Damage Caused by Space Objects where the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.

f. In the event of third-party claims for which the Parties may be liable, the Parties will consult promptly to determine an appropriate and equitable apportionment of any potential liability and on the defense of any such claims.

Article 15 - Mishap Investigation

15.1 In the case of a mishap or mission failure, the Parties agree to provide assistance to each other in the conduct of any investigation, bearing in mind, in particular, the provisions of Article 7. In the case of activities that might result in the death of or serious injury to persons, or substantial loss of or damage to property as a result of activities under this MOU, the Parties agree to establish a process for investigating any such mishap as part of their program/project implementation plans.

Article 16 - Amendment

16.1 This MOU may be amended or extended by written agreement of the Parties.

Article 17 - Consultation and Settlement of Disputes

17.1 The Parties' respective points of contact, identified in Article 6.4 and 6.7, shall consult promptly with each other on all issues involving interpretation or implementation of this MOU. These points of contact will attempt to resolve all issues arising from the implementation of this MOU.

17.2 In the case of a question of interpretation or implementation of the terms of this MOU, such questions that cannot be resolved by the Parties' respective points of contact shall be referred for joint resolution to the NASA Associate Administrator for Science Mission Directorate and the ASI Director of the Observation of the Universe, or their designees; and if unresolved at this level, to the NASA Administrator and the ASI President, or their designees, for joint resolution.

Article 18 - Entry into Force and Termination

18.1 This MOU shall enter into force upon signature by the Parties and the conclusion of an agreement to be effected by an exchange of diplomatic notes incorporating its terms and conditions. This MOU shall remain in force until February 28, 2013, to permit completion of the GLAST mission and data-analysis period. This MOU may be extended by mutual written agreement of the Parties, provided that the agreement effected by the exchange of notes remains in force. The interim agreement of November 11, 2004, shall terminate upon entry into force of this MOU.

18.2 Either Party may terminate this MOU at any time by giving the other Party at least six months written notice of its intent to terminate. Termination of this MOU shall not affect a Party's continuing rights and obligations under Articles 5, Rights in and Distribution of Scientific Data; 7, Transfer of Goods and Technical Data; 8, Intellectual Property; 11, Customs Clearance, Taxes, Immigration and Ownership; and 13, Liability, that shall continue to apply after the expiration or termination of this MOU. In the event of termination, the Parties shall endeavor to minimize the negative impacts of any such termination on the other Party.

Done in duplicate in the English language.

For the United States
National Aeronautics and Space
Administration

Date: February 22, 2007

For the Italian Space Agency

Date: 27 MAR. 2007

I certify that to be a true copy of the signed original.

Timothy Tawney